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Notes on *Syzygium* (Myrtaceae) in Papua New Guinea

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Abstract

Four new species of *Syzygium* (Myrtaceae) are described for Papua New Guinea: *Syzygium cravenii*, *S. kuiense*, *S. lababiense*, and *S. pterotum*. *Syzygium platycarpum* (Diels) Merr. & L.M.Perry is described and discussed because this species is inadequately known, with last known collection of this species from Papua New Guinea in 1919 and from Indonesian Papua in 1926.

Introduction

One of the centre of species diversity for the genus *Syzygium* is Malesia (Craven 2006), with the genus being abundant in a diverse range of habitats throughout Papua New Guinea (Snow and Craven 2010, Takeuchi 2002, 2006). Hartley and Perry (1973) provided the most recent guide to the identity of the species in Papuasia, lamenting that when identifying specimens of *Syzygium*, "the accumulation of unnamed material in the Arnold Arboretum herbarium was as large as that of the named collection", a situation that has not improved significantly in many herbaria. During the eleven years of the research project to document the trees of Papua New Guinea (Conn and Damas 2006), many species of *Syzygium* have been collected and studied. Of these, there have been several collections that are morphologically distinct from previously described taxa. The conservation status of the four new species described here is unknown, being data deficient (sensu IUCN 2008). All four are only known from the type gathering even though they were collected from areas that are reasonably well-known botanically. A review of the extensive collections of *Syzygium* at CANB, LAE and NSW did not reveal any additional collections of these new species; however, it is expected that further collections may yet prove to be held in other herbaria. The evaluation of additional collections is required to understand the extent of morphological variation within each of these new species. The conservation status of *S. platycarpum* is also unknown, being regarded as data deficient.

Taxonomic account

The descriptions of the following species are all based on measurements *in situ*, confirmed and supplemented by additional measurements on dried herbarium material when necessary. The distribution of each species is summarised according to the botanical regions of Papuasia (Womersley 1978).

Syzygium pterotum B.J.Conn & K.Q.Damas sp. nov.

Type: Papua New Guinea: Morobe: Baden Bay, Aruviri River at Kui, *K.D.Q. Damas LAE79730*, 15 Oct 2011 (holotype: LAE; iso. NSW).

Diagnosis: *Syzygium pterotum* is morphologically most similar to *S. pteropodum* (Lauterb. & K.Schum.) Merr. & L.M.Perry. Both species have juvenile stems that are distinctly 4-angular, although in *S. pteropodum*, the juvenile stems are more frequently only flattened (slightly angular) on both sides on distal internodes. The leaf lamina of *S. pterotum* is more or less elliptic, with a distinct intramarginal vein, whereas those of *S. pteropodum* are obovate with the intramarginal vein being less distinct. The peduncles are shorter (c. 5 mm long) and with shorter wings in *S. pterotum*, compared to the peduncle of *S. pteropodum* being 15 cm long and strongly winged.

Canopy trees, up to 20 m high; bole cylindrical, up to 30 cm diam., straight, up to 10 m long; buttresses absent, or if present, then short. *Bark* grey or brown, rough, scaly or flaky or peeling; lenticels irregular; bark <25 mm thick; under-bark pink or grey; blaze strongly aromatic, pleasant; consisting of one layer, white or yellow, fibrous; exudate colourless, not readily flowing, changing to purple or grey on exposure to air, not sticky. *Branchlets* 4-angled, soon becoming slightly flattened to more or less terete. *Leaves* spaced along branches; *petiole* 8–10 mm long, not winged, not swollen; *lamina* elliptic to narrowly elliptic, 13–18 cm long, 5.5–7.5 cm wide; base cuneate, margin flat, apex acuminate, venation pinnate, secondary veins open, 12–15 on each side of mid vein, prominent, angle of divergence from mid vein 28–30(–35)°; tertiary veins indistinct; intramarginal vein 1, distinct, 1–1.5 mm from lamina margin; lower surface blue-green, upper surface dark green, hairs absent, oil glands not visible (to unaided eye). *Inflorescence* axillary, branched (3-flowered); peduncles c. 5 mm long, shortly winged (wings c. 0.2 mm wide), hence appearing quadrangular in cross-section; pedicel c. 1 mm long; bracteoles not seen; only old flowers seen (shape and size not measurable); base of staminal filaments persistent, many. *Fruits* sub-ellipsoidal, 20–30 mm long, 15–20 mm diam., fleshy. *Seeds* 1, up to 30 mm, up to 15 mm wide. **Fig. 1**

Fig. 1. *Syzygium pterotum*. Herbarium collection (*Damas LAE79730*) showing a branchlets with leaves and two old inflorescences with the remains of the flowers. Scale bar: 5 cm

Distribution: Papua New Guinea: Morobe province

Etymology: The specific epithet 'pterotum' is derived from πτερωτόν (Greek: 'pterōton), feathered or winged; here referring to the small wings (c. 0.2 mm wide) that make the peduncles appear 4-angled over their length.

Habitat: This species occurs in lowland forest on ultra-mafic soils in association with other species of *Syzygium*, *Cryptocarya* and *Calophyllum*.

Notes: This new species, an occasional timber species, is characterised by having shortly winged peduncles and leaves that have an angle of divergence of the secondary veins from the mid vein that is usually 28–30°.

In the morphologically similar species *S. pteropodum*, Schumann and Lauterbach (1900, p. 473, as the basionym *Jambosa pteropoda*) record the fruits as 15 mm long and 12 mm diam., whereas those of *S. pterotum* are 20–30 mm long, 15–20 mm diam. This size difference is thought to only be a difference between immature fruits (as suggested by Schumann and Lauterbach, *loc. cit.*) and fully developed ones. The protologue of *Jambosa pteropoda* cites this taxon as a shrub 5 m tall; however, it is possible that this species was described from a young plant.

Syzygium platycarpum (Diels) Merr. & L.M.Perry

Journal of the Arnold Arboretum 23: 278 (1942)

Jambosa platycarpa Diels, *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 57: 385 (1922).

Lectotype (here chosen)**:** Papua New Guinea: East Sepik: Sepik-Gebiet: Hauptlager Malu [4°13'22"S; 142°52'11"E], Alluvialwald, 10–40 m [altitude], *Ledermann 6787*, 26 Mar 1912 (K – image!).

Residual syntypes: Papua New Guinea: East Sepik: 'Sepik-Gebiet: Hauptlager Malu, Alluvialwald, 10–40 m' (Diels 1922, p. 386), *Ledermann 7145*, 26 Apr 1912 (presumably B, n.v.); *10690*, 22 Jan 1913 (labelled paratype, B100279308 – image!); *10805*, 1 Feb 1914 (presumably B, n.v.)

Subcanopy trees, c. 15 m high; bole cylindrical, 40 cm diam., crooked bole, 10 m long; buttresses absent. *Bark* brown or grey, rough, scaly or flaky, 10 mm thick; under-bark pale green; blaze faintly aromatic or non-aromatic, pleasant, consisting of one layer, pale yellow cream-coloured or white, fibrous; exudate colourless, not readily flowing, changing to faintly pale red, then to bluish or purplish on exposure to air, not sticky. *Branchlets* more or less terete. *Leaves* spaced along branches; *petiole* 5–10 mm long, not winged, not swollen; *lamina* elliptic, 12–20 cm long, 5– 9.5 cm wide; base slightly cuneate, margin flat, venation pinnate, secondary veins open, 15–20 on each side of mid vein, prominent, angle of divergence from mid vein 45–50° (distal secondary veins at up to 55°); tertiary veins indistinct or faint; intramarginal vein 1, distinct, 1–2 mm from lamina margin; lower surface green, upper surface green, hairs absent, oil glands not visible (to unaided eye). *Inflorescence* axillary or terminal, unbranched or few-branched, 3–7-flowered; pedicel 5–8 mm long; bracteoles not seen; hypanthium size and shape unknown; sepals 4, unequal; corolla not seen; stamens many, white. *Fruits* slightly flattened subglobular, (15–)18–20 mm long, 15–18 mm diam., red. *Seeds* 1, as wide as long. **Figs 2, 3**

Distribution: Papua New Guinea: East Sepik (Ledermann 1919) and Western provinces.

Specimen examined: Indonesia: Papua: Jayapura: Mamberamo, Otken River, elevation ±60 m, *Docters van Leeuwen 11386*, Nov 1926 (K – photo). Papua New Guinea: East Sepik: 'Kaiser Wilhelmsland, Sepik' *Ledermann 6782*, Feb. 1912 (Ledermann 1919) (K – photo); *Ledermann 10690*, 22 Jan 1913 (B100279308 – image!); Western: Tabubil, *B.J. Conn 5774, K.D.Q. Damas, O. Paul & K. Fazang*, 18 Jul 2012 (LAE, NSW).

Notes: Hartley and Perry (1973) considered that this species is 'very closely related' [morphologically similar] to *S. tierneyanum* (F.Muell.) T.G.Hartley & L.M.Perry but stopped short of regarding them as conspecific. Based on the protologue (Diels 1922, as *Jambosa platycarpa*) and the recent collection (*Conn 5774*), *S. platycarpum* is regarded as a woody shrub to sub-canopy tree, possibly smaller than *S. tierneyanum*; with secondary veins open and prominent (cf. *S. tierneyanum* indistinct or not visible), with angle of divergence of secondary veins from mid vein 45–50° (cf. *S. tierneyanum* 35–44°); and inflorescence is terminal, unbranched or with only a few branches, 3–7-flowered, cf. *S. tierneyanum* that has axillary inflorescences or flowers on twigs below or back from the leaves, with inflorescences heavily branched, usually much more than 7-flowered, (Hyland *et al.* 2010 onwards).

Although *S. platycarpum* was originally described in the early 20th Century (Diels 1922), this species had not been re-collected from Papua New Guinea. However, one collection (*Conn 5774*) from Tabubil (North Fly district, Western Province) is here regarded as morphologically identical to *Syzygium platycarpum*, based on photographs of *Ledermann 6782* and *10690*. The *Ledermann* collections were gathered from near Malo, on the Sepik River (East Sepik province), from low altitude alluvial forests, so the Western province collection, from lower-montane forests (elevation = 540 m), represents a major distributional disjunction.

Fig. 2. *Syzygium platycarpum* (Diels) Merr. & L.M.Perry. **A.** detail of trunk showing rough, greyish, flaky outer bark; **B.** outer bark and blaze showing single-layered, pale yellow cream-coloured fibrous inner bark, with colourless exudate that changes quickly on exposure to air to faintly pale red, then to bluish or purplish. Photo: B.J. Conn.

Fig. 3. *Syzygium platycarpum* (Diels) Merr. & L.M.Perry. Fruits, showing apical view with remains of calyx (left) and basal view with distal remains of pedicel (right). Photo: B.J. Conn.

Syzygium labadiense B.J.Conn & K.Q.Damas sp. nov.

Holotype: Papua New Guinea: Morobe: Kamiali, *K.D.Q. Damas LAE79752*, 18 Oct 2011 (LAE)

Diagnosis: This species is similar to *S.iteophyllum*. In particular, both species have morphologically similar leaves, but the inflorescence of *S.iteophyllum* is cauliflorous, with axes furfuraceous, whereas *S. labadiense* has terminal inflorescences that have glabrous axes. Furthermore, *S. labadiense* has purple fruits whereas those of *S. iteophyllum* are red.

Canopy trees, up to 30 m high, or subcanopy trees, up to 12 m high; bole cylindrical, up to 50 cm diam., straight, up to 20 m long; buttresses up to 2 m high or absent. *Bark* orange or brown, rough, scaly or flaky or peeling, pustular; lenticels irregular; bark 5–7 mm thick; under-bark grey, orange or brown; blaze strongly aromatic, pleasant, consisting of one layer, orange, red, brown or grey, fibrous; exudate present, colourless, not readily

flowing, changing colour, becoming darker, on exposure to air, or not changing colour, slightly sticky or not sticky. *Branchlets* more or less terete to 4-angled distally. *Leaves* spaced along branches; *petiole* 4–8 mm long, not winged, attached to base of leaf lamina, not swollen; *lamina* elliptic, 5.5–13 cm long, 1.5–5 cm wide; base obtuse to slightly cuneate, margin flat, apex acuminate, venation pinnate, secondary veins closed, many on each side of mid vein, not prominent (faint), but visible, angle of divergence from mid vein 29–36°; tertiary veins faint; intramarginal vein distinct, 1.5–2.5 mm from lamina margin; lower surface pale green, upper surface dark green, hairs absent, oil dots present or indistinct, domatia absent;. *Inflorescence* axillary and terminal, much-branched; pedicel 2–5 mm long, bracteoles c. 3 mm long; hypanthium size and shape unknown; flowers 4–5 mm long, small, up to 6 mm diam. (only known in bud); calyx and corolla 4-merous; stamens many, filaments present; carpels bilocular. *Fruits* globular, 18–20 mm diam., purple, fleshy. *Seeds* 1, as wide as long. **Figs 4, 5**

Distribution: Papua New Guinea: Morobe: Kamiali.

Etymology: The specific epithet 'lababiense' acknowledges the field support provided by the people of the Lababia village, Kamu Yali, Kamiali Wildlife Management Area, Morobe Province, Papua New Guinea.

Habitat: Like *S. pterotum*, this species occurs in lowland forest on ultra-mafic soils in association with other species of *Syzygium*, *Cryptocarya* and *Calophyllum*.

Notes: *Syzygium lababiense* is a minor hardwood species that is only known from the Kamiali area of the Morobe Province.

Fig. 4. *Syzygium lababiense* B.J.Conn & K.Q.Damas. **A.** basal section of trunk showing rough flaky, red-brown outer bark; **B.** outer bark with blaze showing single layered inner fibrous bark. Photo: K.D.Q. Damas.

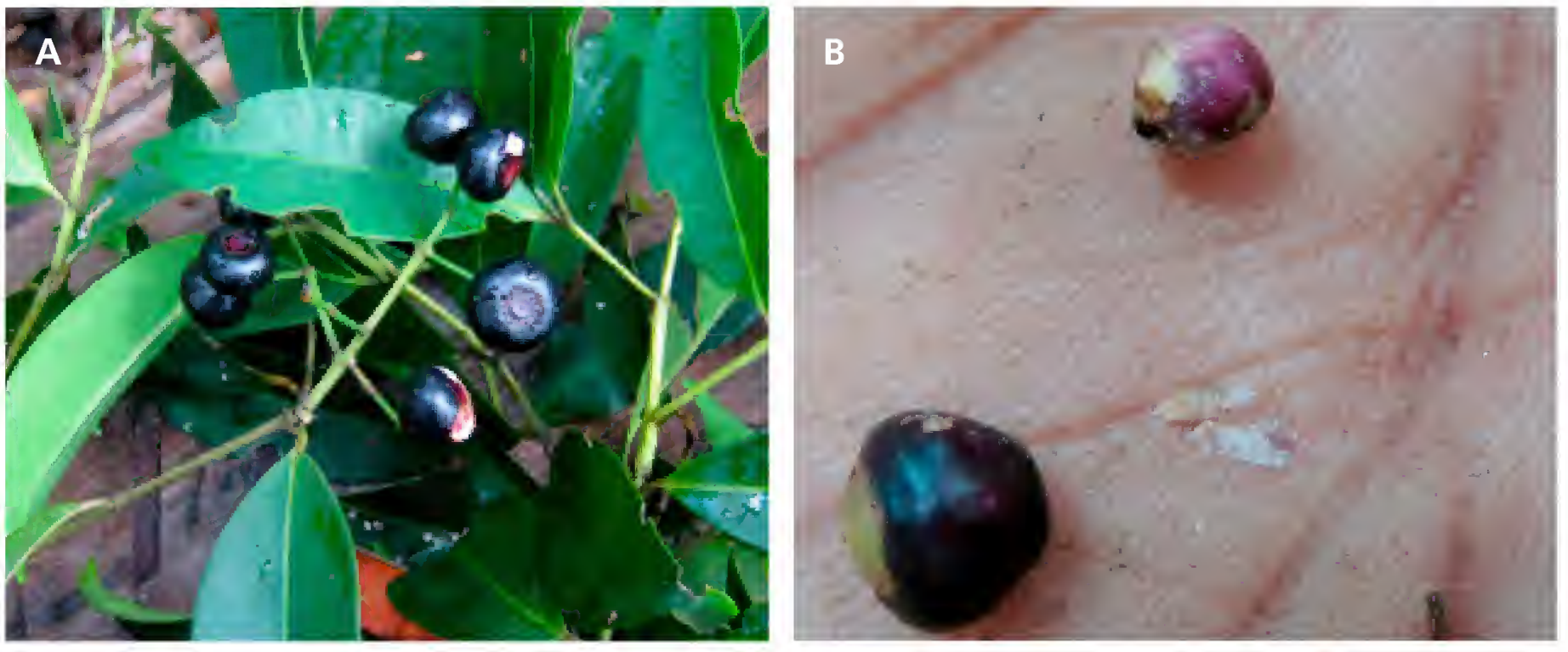

Fig. 5 *Syzygium labadiense* B.J.Conn & K.Q.Damas. **A.** fruiting branchlet showing leaves and purple fleshy fruits, showing leaves with indistinct (faint) secondary veins; **B.** close-up of fruit (left) and seed. Photo: K.D.Q. Damas.

Syzygium kuiense B.J.Conn & K.Q.Damas sp. nov.

Holotype: Papua New Guinea: Morobe: Kui village, *K.D.Q. Damas LAE79700, D. Damas, O. Paul & B. Sule*, 11 Oct 2011 (LAE)

Diagnosis: *Syzygium kuiense* is morphologically similar to *S. decipiens* with a cauliflorous inflorescences, but it differs by having less-branched inflorescences compared to those of *S. decipiens* and the leaf venation is openly spaced, whereas the leaves of *S. decipiens* have closed venation.

Subcanopy trees, 7 m high; bole markedly fluted, 3 cm diam., straight, 2 m long; buttresses absent. *Bark* grey or brown, smooth, slightly pustular; lenticels irregular; bark 1 mm thick; under-bark green; blaze faintly aromatic or non-aromatic, consisting of one layer, pleasant, orange or brown, fibrous; exudate present, colourless, not readily flowing, not changing colour on exposure to air, not sticky. *Branchlets* terete, smooth. *Leaves* spaced along branchlets; *petiole* 4–5 mm long, not winged, not swollen; *lamina* narrowly elliptic, 15–26.5 cm long, 4–6.5 cm wide; base cuneate, margin flat, apex acuminate, venation pinnate, secondary veins open, 18–22 on each side of mid vein, not prominent, but visible, angle of divergence from mid vein 33–40°; tertiary veins indistinct; intramarginal vein 1, faint, c. 1 mm from lamina margin; lower surface pale green, upper surface dark green, hairs absent, oil glands absent or not apparent. *Inflorescence* cauliflorous/ramiflorous, flowers occurring singly (only old flowers seen), shortly pedicellate; bracteoles not seen; hypanthium size and shape unknown; old flowers appear likely to be up to 20 mm long and up to 10 mm diam.; calyx and corolla presumably 4-merous; stamens not known; ovary bilocular. *Fruits* single, subglobular, up to 30 mm long, up to 25 mm diam., bright red, fleshy. *Seeds* 1, subglobular, c. 15 mm long, c. 10 mm diam., ± smooth, adhering to inner fruit wall. **Fig. 6**

Distribution: This non-timber species is only known from the Kui area, south of Lae, in the Morobe Province of Papua New Guinea.

Etymology: The specific epithet 'kuiense' refers to the locality of the type collection from near the Kui village, Morobe Province, Papua New Guinea.

Notes: This species occurs in lowland forest dominated by species of *Syzygium* and Lauraceae, growing in ultra-mafic soils. The dry leaves of *S. kuiense* resemble *Chionanthus* (Oleaceae).

Fig. 6. *Syzygium kuiense* B.J.Conn & K.Q.Damas. **A.** leaves near base of young sapling; **B.** details of leaves, showing the indistinct (faint) secondary veins; **C.** cauliflorous fruits; **D.** seed exposed after some of fruit wall removed. Photo: K.D.Q. Damas.

Syzygium cravenii B.J.Conn & K.Q.Damas sp. nov.

Holotype: Papua New Guinea: West Sepik: Finamoi to Utai road, *K.D.Q. Damas LAE89565 & K. Fazang*, 16 Sep 2013 (LAE)

Diagnosis: The secondary venation of the leaves of *S. cravenii* are morphologically similar to those of *S. decipiens* (Koord. & Valet.) Merr. & Perry. The latter species has cauliflorous inflorescences, whereas those of *S. cravenii* are axillary. It should be noted that some herbarium material of *S. decipiens* have inflorescences that appear to be axillary, but these are on short leafy shoots that arise directly from the trunk of the tree.

Subcanopy trees, c. 20 m high; bole markedly fluted, 30 cm diam., straight, 12 m long; buttresses present; aerial roots absent; stilt roots absent. *Bark* brown, rough, peeling, papery, 8 mm thick; under-bark green; blaze faintly to non-aromatic, consisting of one layer; pink or brown, fibrous; exudate colourless, not readily flowing, not changing colour on exposure to air, not sticky. *Branchlets* more or less terete. *Leaves* spaced along branches; *petiole* 2–4 mm long, not winged, not swollen; *lamina* elliptic, 5–12 cm long, 1.5–4.5 cm wide; base obtuse to slightly cuneate, margin flat, apex acuminate, venation pinnate, secondary veins closed, with many on each side of mid vein, indistinct, but visible, angle of divergence from mid vein 25–30º; tertiary veins indistinct; intramarginal vein 1, faint, c. 1 mm from lamina margin; lower surface pale green, upper surface green, subglossy, hairs absent; oil glands distinct. *Inflorescence* axillary, branched, with peduncle angled; pedicel c. 1 mm long; bracteoles c. 1 mm long, not persistent; hypanthium conical, about as long as calyptra, yellow-green; calyptra hemispherical, distally rounded, slightly darker than hypanthium; flowers 5–6 mm long, c. 5 mm diam.; stamens many, c. 50, 12–15 mm long, white; style c. 15 mm long, white. *Fruits* not seen. **Fig. 7**

Distribution: West Sepik province of Papua New Guinea.

Etymology: This species acknowledges the large contribution that Mr Lyndley Alan Craven (1945–2014) has made to our understanding of the systematics of the genus *Syzygium*. He generously mentored Kipiro Damas, over many years, on the systematics of this genus in Papua New Guinea. He maintained a long interest in the flora of Papua New Guinea, starting in 1964 by providing botanical support for the land resources surveys in New Guinea (in the plant taxonomy unit of the New Guinea Survey Group, Division of Land Research and Regional Survey, CSIRO, Canberra). Lyn remained at the Australian National Herbarium (CANB) as an Honorary Research Fellow from 2009 until his death in 2014.

Notes: This minor hardwood species is only known from the type collection.

Fig. 7. ***Syzygium cravenii*** B.J.Conn & K.Q.Damas. **A.** basal section of trunk showing rough papery, peeling outer bark; **B.** details of leaves, showing the indistinct (faint) secondary veins; **C.** flowering branchlets showing axillary inflorescence and flowers. Photo: B.J. Conn

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References

Conn BJ, Damas KQ (2006) From trees to descriptions and identification tools. In Barwick L, Thieberger N (eds). 'Sustainable data from digital fieldwork.' pp. 33–44 (University of Sydney: Sydney)

Craven LA (2006) Myrtaceae of New Guinea. In Marshall AJ, Beehler BM (eds). 'The ecology of Papua.' pp. 429–434 (Singapore Periplus Editions: Singapore)

Diels L (1922) *Jambosa* DC. in Die Myrtaceen von Papuasien. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 57: 379–396

Hartley TG, Perry LM (1973) A provisional key and enumeration of species of *Syzygium* (Myrtaceae) from Papuasia. *Journal of the Arnold Arboretum* 54: 160–227

Hyland BPM, Whiffin T, Zich FA (2010 onwards) 'Syzygium tierneyanum.' In.'Australian tropical rainforest plants'. (CSIRO & University of Queensland: Canberra & Brisbane) http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Syzygium_tierneyanum.htm (accessed 26 June 2015)

IUCN (2008) Standards and petitions working group. Guidelines for using the IUCN red list categories and criteria. http://intrnet.iucn.org/webfiles/doc/SSC/RedList/RedListGuidelines.pdf (accessed October 2014)

Ledermann CL (1919) Einiges von der Kaiserin-Augusta-Fluss-Experdition. *Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie* 55, Beiblatt 122: 33–44 http://biodiversitylibrary.org/page/192830http://biodiversitylibrary.org/page/192830

Schumann K, Lauterbach K (1900) 'Flora der deutschen Schutzgebiete in der Südsee' (Gebrüder Borntraeger: Leipzig)

Snow N, Craven LA (2010) Five new species of *Syzygium* (Myrtaceae) from New Guinea. *Harvard Papers in Botany* 15: 123–136 http://dx.doi.org/10.3100/025.015.0105

Takeuchi W (2002) Notes and new species in Papuasian *Syzygium* (Myrtaceae). *Edinburgh Journal of Botany* 59: 259–272

Takeuchi W (2006) Introduction to the flora of Papua. In Marshall AJ, Beehler BM (eds). 'The ecology of Papua.' pp. 269–296 (Periplus Editions: Singapore)

Womersley JS (ed.) (1978) 'Handbooks of the flora of Papua New Guinea.' Vol. 1 (Melbourne University Press: Carlton) 278 pp.

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